Lycopene Prolongs the Lifespan and Enhances the Cytotoxicity of NK Cells after Ex Vivo Expansion

Qi Li*, Ting Huyan, Lin-Jie Ye, Jun-Ling Shi, Qing-Sheng Huang
Key Laboratory for Space Bioscience and Space Biotechnology, School of Life Sciences, Northwestern Polytechnical University
Xi'an 710072, Shaanxi, People's Republic of China.
liqi_1111@nwpu.edu.cn

Abstract — Lycopene is a nonprovitamin A carotenoid mainly found in fruits and vegetables, which has been reported to possess a variety of biological effects. The properties of lycopene on human natural killer (NK) cells after ex vivo expansion were assessed in the present study. Results showed that lycopene has a positive effect on NK cells viability and cytotoxicity. Aging and apoptosis started from the fourth week onwards in the cultured NK cells which were obtained from the peripheral blood mononuclear cells (PBMC). Supplemented with lycopene (5μM) can restore the decreased viability and cytotoxicity of NK cells and reduce NK cells apoptosis caused by aging during fourth-sixth week culture. Its anti-apoptosis effect in NK cells may be related to lycopene which can decrease the expression of caspase 3 and 9 genes. Furthermore, lycopene can enhance the IFN-γ expression in gene and protein level after 7d treatment. However, lycopene did not affect the functional receptor's (NKG2A, NKG2D, NKp30 and NKp44) expression on NK cells. These results indicated that lycopene has a positive effect on NK cells. As a health product, it may help to prolong the lifespan and enhance the cytotoxicity of NK cells after ex vivo expansion.

Key Words: Lycopene; Human natural killer (NK) cells; Apoptosis; Cytotoxicity; Caspase.